PAVED AREA REMEDIAL INVESTIGATION REPORT
NEWARK TERMINAL
NEWARK, NEW JERSEY
ECRA CASE NO. 84455
VOLUME I - SUMMARY

PREPARED FOR:

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IT PROJECT NO. 529344

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ENG/KP453-rpt

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1.0 INTRODUCTION

The paved areas in the east and west yards were identified as areas of environmental concern during site investigations performed pursuant to the New Jersey Environmental Cleanup Responsibility Act (ECRA) at the former Getty Refining and Marketing terminal located on Doremus Avenue in Newark, New Jersey. As such, a remedial action was presented in the site Cleanup Plan submitted to, and conditionally approved by the New Jersey Department of Environmental Protection (NJDEP) in February of 1990. A copy of the approval letter is found in Appendix A of Volume I.

The following report summarizes the results of the investigations in the paved Areas presents a summary of a Risk Assessment based on the results of these investigations; and proposes a remedial effort to address the paved area based upon the risk assessment. The risk assessment can be found in Volume II and analytical results with attendant QA/QC not previously submitted are presented in Volumes III through V.

2.0 SAMPLING

2.1 1988 SAMPLING

The paved areas became areas of concern based upon the results of soil borings around previously removed tank locations during the Phase III investigation. These results were originally presented in a report submitted to the NJDEP in August of 1988 entitled "Revised Sampling and Analysis Plan Report for Texaco Refining and Marketing Inc., at the Former Getty Refining and Marketing Company Site, Newark, New Jersey, ECRA Case #84455," dated August 11, 1989. That document contains a summary of the Phase III Investigation and all associated boring logs, analytical data sheets, and quality assurance/quality control data. Analytical results from paved area samples are summarized in Tables 1-3 in this report. They are also presented along with sample locations in the west yard on Figure 2 and with sample locations in the east yard on Figure 3. Figure 1 is a general facility layout.

2.1.1 1988 Postexcavation Underground Tank Sampling

Subsequent to removal of six underground storage tanks, Texaco Refining and Marketing, Inc. performed postexcavation soil sampling and analyzed the samples for TPHC, benzene, toluene and xylene. This was done based on NJDEP's request for delineation of the vertical and horizontal extent of these compounds.

A total of sixteen soil borings were drilled in the tank excavation areas to a depth of six inches above the water table which was encountered at 2.5 to 3.0 feet below grade. Each sample analyzed contained TPHC concentrations greater than the established guideline of 500 ppm TPHC. The range of TPHC concentrations was 980 ppm to 38,000 ppm.

Thirteen of the analyzed samples contained volatile organic compound concentrations greater than ECRA guideline of 1 ppm total volatile organic compounds.

2.1.2 1988 Background Sampling

Two soil borings were performed for the purpose of evaluating background concentrations of TPHC, lead, benzene, toluene, and xylene (BTX). The two boring locations were specified by the NJDEP along the property line of the east yard. The 6-12 inch sample from 2B-28 was analyzed for BTX,

One sample from SB-28 had a TPHC concentration above the established guideline at 4,400 ppm, respectively. Lead concentrations were not above ECRA guidelines. The BTX concentration of 73 ppm exceeded the ECRA guideline of 1 ppm.

2.2 1990 DELINEATION SAMPLING

Item 6 of the approval letter recognized the intent to perform additional soil sampling to confirm the most cost effective remediation technology in the paved Area. Results from studies of alternative approaches at the site have been submitted in a report entitled "Report on Preremedial Activities at the Newark Terminal, Newark, New Jersey, ECRA Case #84455" dated May 1990.

Based upon the results presented in that report excavation was chosen as the most expedient method of remediation. To this end, a program of delineation sampling was implemented in order to define the limits of the areas to be excavated.

Samples were to be analyzed for TPHC on an expedited basis with further, more costly analysis dependent upon an acceptable, less than 500 ppm, TPHC result.

Samples were to be collected at set intervals extending horizontally, with subsequent sampling performed until the impacted areas were defined. Beginning in May and continuing through to September of 1990 over 125 samples were collected during five rounds of sampling at increasing intervals from areas known to have been impacted. As work progressed it became apparent that defining limits of excavation utilizing the 500 ppm TPHC level established for the site might not be feasible and the prospect of utilizing a greater concentration based upon a human health risk assessment was examined.

In order to facilitate the preparation of a risk assessment the final round of samples collected were analyzed for volatiles, base/neutrals and lead as well as TPHC. The analytical results of all samples from the paved areas are summarized in Tables 1 through 3, and are presented along with the sample locations in Figures 2 and 3. A summary of the Risk Assessment is found in Section 3.0 and the entire Risk Assessment is presented as Volume II of this report. Analytical data and QA/QC information is found in Volumes III through V. Table 6 and 7 are an index of QA/QC data for the sample results presented in Tables 2 and 3.

3.0 RISK ASSESSMENT SUMMARY

The Industrial Risk Assessment (volume II of this cleanup plan) is being submitted by Texaco Refining and Marketing Inc. (TRMI) pursuant to NJAC Section 7:1-31.32.12 of the New Jersey Environmental Cleanup Responsibility Act (ECRA) regulations issued by the New Jersey Department of Environmental Protection (NJDEP). The document addresses the potential risk of soils present at the Newark Terminal to industrial employees.

In general, risk assessments (RA) estimate the potential magnitude and probability of potential harm to public health and the environment. This RA addresses the potential human health impacts associated with past activities at the Newark Terminal, Newark, New Jersey. The procedures and methodologies used in this RA followed the Risk Assessment Guidance for Superfund, Human Health Evaluation Manual, Volume 1 (RAGS; USEPA, 1989). The Risk Assessment consists of four components: Chemical Identification (Section 2.0); Exposure Assessment (Section 3.0); Toxicity Assessment (Section 4.0); and Risk Characterization (Section 5.0).

The risk assessment does not purport to quantify precisely the expected human risk, but attempts to estimate in quantitative terms an upper limit on the risk to humans that could be expected from a given level of exposure to the chemicals of potential concern. The methodology incorporated assumes humans are no more or less susceptible to the effects of these chemicals than are the most susceptible members of the animal species for which toxicity data are available. Thus, this assessment is used as a means of comparing risks at various exposure levels and illustrating the toxicological judgement that a reduction in exposure will reduce risk.

The assessment attempts to avoid underestimating human risk, thereby leading to the possible overestimation of the actual risk to human health. However, because of the inherent uncertainty in extrapolating from animal data to the expected human experience, the numbers produced in the assessment must be interpreted cautiously. They are estimates of average and upper limits on risks and, though useful for comparative purposes, cannot be said to quantify actual human risk precisely.

This site specific assessment arrived at two sets of conclusions one for present site use and one for future site use. The present use scenario depicts the risk to a worker performing normal activities at the terminal with the asphalt pavement in place. This prevents direct contact with the soil; therefore, the risk to either direct contact or ingestion of site-related soils would be of minimal consequence since a complete exposure pathway for either route would not exist. The RA also indicated that the risk

from the air pathway is well within the acceptable range.

The future use scenario reviewed the risks a plant or facility worker would have given exposure to the soil below the pavement in an industrial setting. The choice of an industrial setting such as a petroleum distribution or refining center is appropriate given the surrounding industrial setting and the present and future intent of the current owner (Powertest) of the property. Exposure to the soil would require the removal of the asphalt pavement, which may or may not occur on a limited scale, for activities such as: footing excavations, replacement of pavement, or other site improvement activities. The RA indicated direct contact (dermal exposure risks), would be above the acceptable range. Next the assessment sought to determine a remedial action level for contamination which would allow for an acceptable risk given the industrial setting described above. The assessment arrived at a TPHC concentration (~13,400 ppm) based upon the analytical profile of the soil/fill below the pavement and the most conservative pathway of exposure (soil ingestion). The concentration of 13,400 ppm is site specific. This value is generally higher than those values cited by the NJDEP. The model used to address acceptable TPHC concentrations by the NJDEP assumes only carcinogenic polyaromatic hydrocarbon (PAHs) constituents. The large volume of information generated across the site indicates this is not the case, as the percentage of carcinogenic PAHs is substantially less than the noncarcinogenic constituents present. Therefore, the calculated allowable TPHC concentration is higher.

In conclusion, the RA indicates that the presence of the materials below the asphalt pavement does not present an immediate risk, however, there are potential risks as presented in the future use scenario. Based upon the analytical profile of the fill/soil materials, use of a remedial action level of 13,400 ppm for TPHC would support a remediation plan which, when completed, would result in an acceptable level of risk (carcinogenic risk equal to 1.0×10^{-6} and noncarcinogenic hazard index of 1.0). A remediation plan which would consist of limited soil removal as guided by the 13,400 ppm TPHC remedial action level is supported by the following:

1. The majority of the constituents in the fill soil below the asphalt are hydrophobic (such as benzo(a)pyrene, etc.) and have a limited mobility. They exhibit a preferential partitioning to soil particles and do not appreciably leach into underground aquifers or surface waters. This statement is confirmed by the most recent semi-annual groundwater sampling results which are summarized in Table 5. The results indicate four wells with very low concentrations of volatile organics; and BNAs detected in only 4 of 14 wells sampled. The constituents detected in the groundwater will readily degrade over time given the naturally occurring bacterial population. (see bioreclamation study in the Report on Pre-Remedial Activities)

2. The site will continue to be used as a petroleum distribution terminal. Thus any remedial action levels proposed should bear this in mind and be concerned with the risk to the workers.

3. Many of the constituents are components of the macadam itself; the concentrations portrayed herein may not accurately reflect the actual levels in the soils. Therefore large scale excavation followed by repaving the areas for continued industrial use would not significantly improve the soil quality.

Justification is provided by an examination of the local hydrogeological conditions and the physicochemical nature of the constituents themselves. Further defense for this option can be found in the scrutiny of peripheral environmental compartments and whether constituents have migrated appreciably from their site of deposition.

Authors Henry and Hansen (1989) have documented the use of the aforementioned option for an underground gasoline storage tank remediation in the greater Los Angeles Basin within the flood plain of the Santa Ana River. An initial sampling effort was performed after the tank was removed and it was determined that petroleum hydrocarbon contamination was limited in scope and had not migrated laterally beyond the immediate area of the tank excavation. No downward vertical migration had occurred below the tank and the position of the groundwater was at least 100 feet deeper than the deepest detected presence of the hydrocarbons. At that time, no further remedial actions were recommended and a fate and transport study was undertaken to ensure that no additional migration of sequestered constituents would occur.

From this study, it was determined that most of the hydrocarbon deposition occurred as a result of spills from unsealed tanks filled during transfers of product from tank trucks to the underground storage tanks. If we consider this scenario somewhat analogous to the site under consideration at the present time, some of the same assumptions can be made for recommending no remedial action. First, the downward migration of liquid hydrocarbon product typically takes place where sufficient concentrations are present for liquid flow. Product can move downward through the soil until it reaches a saturation point, at which time, it can be said to be immobile. Two factors are responsible for determining the depth to which hydrocarbons can migrate: porosity of the soil and the chemical makeup of the hydrocarbons as reflected in their "maximum residual saturation". At or below this property, the product will not move as a liquid in the soil. The residual saturation for various hydrocarbons has been estimated as follows: gasoline -10%; diesel and light fuel oil - 15%; and lube and heavy fuel oil -20% (Mull, 1971). In the present study, the majority of product contained on-site was comprised

of various grades of gasolines and No. 2 fuel oil. With this in mind, theoretical hydrocarbon concentrations were calculated for differing soil porosities using the following formula:

(1) Hydrocarbon Concentration = $\frac{\text{Weight of hydrocarbon}}{\text{Weight of hydrocarbon plus soil weight}}$

(2) Weight of hydrocarbon = Unit weight of water (62.4 lb/ft^3)
x Specific gravity of gasoline (0.8)
x Residual saturation (0.1)
x Porosity (varies from 0.2 to 0.6)

(3) Weight of soil = 146 lb/ft^3

This soil weight was assumed for sandy and silty soils (Lambe and Whitman, 1969), as is the case for this site. Table 4 shows the possible range of residual hydrocarbon concentrations in the soils for varying porosities. If the assumption is made that the residual saturation of product in the soils at the Newark Terminal is between 10 and 15% (gasoline/No. 2 fuel oil mixture), it would require a concentration of approximately 8,500 mg/kg at the lowest porosity or as much as 25,000 mg/kg at the highest porosity for the hydrocarbons to achieve liquidity. In actuality, the average total petroleum hydrocarbon (TPHC) concentration is 7,394 mg/kg; clearly, this value does not exceed the minimum. Therefore, TPHC present at the Newark Terminal would not be expected to migrate.

The second piece of evidence which can be utilized to determine whether remedial action is warranted in this case is an examination of whether significant concentrations of site-related materials have leached into groundwater or surface water. As was demonstrated (Table 2-3 Volume II), few constituents were identified at concentrations higher than the instrument detection limit. Therefore, based on these samples, it can be assumed that petroleum hydrocarbons have not mobilized down to groundwater levels.

The hydrocarbons which remain in the soils are expected to biodegrade over time by naturally occurring soil bacteria. Under aerobic conditions, the final by-products of the metabolism are expected to be carbon dioxide and water. Since the hydrocarbons are in the soils above the water table, they will be subject to long-term aerobic conditions and will diminish in concentration over time due to microbial action.

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February 10, 1992

Mr. Gary Sanderson
State of New Jersey
Department of Environmental Protection
Division of Hazardous Waste Management
CN-028
Trenton, N. J. 08625-0028

RE: Newark Terminal Cleanup Plan
ECRA Case No. 84455

Dear Mr. Sanderson:

Texaco Refining and Marketing Inc. (TRMI) is requesting a modification to the approved Cleanup Plan for the paved area at the subject site. We are anxious to complete the work on this facility and we believe this proposal will meet your requirements. Subject to your prompt approval, the sampling will begin immediately and the cleanup should be completed within six months.

TRMI bases the proposal on the following cleanup parameters:

* Total Petroleum Hydrocarbons (TPHC)	10,000 ppm
* Base Neutrals (BN's)	100 ppm
with CaPAH's	2.5 ppm each
* Volatile Organics (VO's)	100 ppm
with Benzene not to exceed	13 ppm

This proposal is being submitted in letter format for expediance. If you require the sampling plan and modification to the Cleanup Plan in the formal ECRA format it will be provided.

Figure 1, (East Yard) and Figure 2, (West Yard) are attached and outline the areas where TPHC's were equal to or exceeded 10,000 ppm and the locations of sampling points required to complete delineation for VO'S and BN's. The areas will be completely delineated prior to soil removal and replacement. Replacement will consist of clean fill material, base aggregate and topped with asphalt pavement. Individual areas are discussed in detail in the following paragraphs.

AREA I

Area I is located to the west of the dispatch office and abuts the location where two underground tanks were removed. All samples taken in this area except SB-19 were greater than

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10,000 ppm TPHC's. Two samples will be taken to confirm total delineation numbered 5HA1 (VO, BN) and 5HA2 (TPHC, VO, & BN). The soil will be removed to within 2 1/2 feet of the sewer on the west and south sides and to the old excavation for tank removal on the east side. Sample point SB-20 indicated 13,000 ppm TPHC's. However it is too close to the building to excavate and it is proposed to leave the soil in place.

AREA II

Area II is located between the southeast end of the loading rack and the foam building. This area also delineated in a systematic manner. A sewer divides the area. On the north side of the sewer the soil will be removed from 2 1/2 feet from the loading rack to 2 1/2 feet from the sewer. On the south side of the sewer, the soil will be removed from 2 1/2 feet from the sewer until the appropriate cleanup level is reached. Sample Nos. 5HA3 through 5HA7 will be taken as indicated. Sample Nos. 5HA3 through 5HA5 will be tested for VO's and BN's. The other two samples will also be tested for TPHC's.

Sample No. 5HA17 tested high for TPHC's. However, this sample point abuts the sewer and it is proposed to leave the soil in place.

Two locations in Areas I and II were tested for VO's and BN's (HA4 & 4HA3). Both samples were high dilutions and are located in areas to be removed.

AREA III

This area is located between the northeastern end of the loading rack and the fence. The source of the Petroleum Hydrocarbons appears to have been the underground storage tanks and the hydrocarbon has been completely delineated. The two underground storage tanks were removed from this area, as indicated on the attached map, and replaced with clean soil. Samples will be taken as indicated by sample nos. 5HA3 through 5HA13. All samples will be tested for VO's and BN's.

Two samples (HA-16 & HA-13) were tested for VO's and BN's and both were within ECRA limits. Another sample (3HA-2) was tested for BN's only and was within limits.

Sample 2HA-39 is an isolated sample above 10,000 ppm TPHC and this immediate area will be removed.

AREA IV

Area IV is located between the loading rack and the entrance

grea. Thirty Three samples were taken in this area. Only three (HA-19, 2HA-18 & 3HA-10) indicated TPHC's above 10,000 ppm. Two samples (HA-19 & 4HA-5) were tested for VO's and BN's. The BN's were within limits on both samples but the Benzene exceeded limits on 4HA-5. BN's only were tested on three additional samples (2HA-57, 2HA-61 & 3HA-9). Sample 2HA-61 indicated CaPAH's above the ECRA limits. The dilution factors were not exceedingly high in this area (highest 792). These results indicate a patchwork area with no real point source.

It is proposed to take six samples as indicated numbered 5HA-14 through 5HA-19 and test for VO's and BN's. If these results are within limits, the three small areas will be removed and replaced.

AREA V

Thirty eight samples were taken in this area. Only six (2HA-22, 2HA-23, 2HA-55, 3HA-16, 4HA-6 & 5B-15) indicated TPHC's above 10,000 ppm. Six samples (HA-33, HA-35, HA-38, 2HA-51, 3HA-6 & 4HA-7) were tested for VO's and BN's. All six were within limits. The dilution factor in all samples were low enough to obtain satisfactory results except 4HA-6. One additional sample (2HA-52) was tested for BN's only with satisfactory results.

It is proposed to take one additional sample (5HA-20) as indicated and test for TPHC's, VO's and BN's. If these results are within limits, the two small areas indicated will be removed and replaced. Sample 2HA-23 is within one foot of the fence and the samples around it are within limits, therefore, it is proposed to leave in place.

AREA VI

These samples (4HA-1 through 4HA-4) were taken as background samples because they were outside the operating area. This is a parking area. All four were tested for TPHC's, VO's and BN's. Two samples (4HA-1 & 4HA-2) indicated TPHC's above 10,000 ppm. Three samples (4HA-1, 4HA-2 & 4HA-3) indicated VO's above the limits. However, two samples (4HA-1 & 4HA-3) had very high dilution factors. Only one sample (4HA-3) indicated Benzene. All BN's were within limits.

It is proposed to take nine additional samples as indicated (5HA-21 through 5HA-29) and test for TPHC's and VO's. The soil will be removed and replaced as delineation samples indicate.

AREA VII

This area is really a patchwork of sampling results with many

underground obstructions. One sample (GHA-4) indicated 1940 ppm lead and samples within seven feet on either side were below 1000 ppm.

Samples SB-12 and SB-14 indicated TPHC's above 10,000 ppm which were the only samples in this vicinity to contain high TPHC's. An underground steel tank was removed from between these samples and replaced with a new 500 gallon fiberglass tank. The tank is in operation and used to collect used motor oil.

Sample GHA-10 indicated 11,000 ppm TPHC. The samples on either side (within six feet) were below 500 ppm TPHC.

Sample GHA-12 indicated 71,000 ppm TPHC. The first try eight feet away hit a boulder. Four additional tries resulted in one sample (2GHA-1) and this sample indicated 2,540 ppm TPHC.

Samples GHA-14, 2GHA-3 and 2GHA-5 indicated TPHC's above 10,000 ppm. Additional delineation sampling was tried but constructions and asphalt thickness that extended to the groundwater prevented the taking of samples.

No additional remediation is proposed for this area. The locations where high TPHC and/or lead readings were obtained have adjacent samples with low readings where samples could be obtained. Sampling was attempted around GHA-12, 2GHA-3 and 2GHA-5 but the samples could not be obtained because of obstructions and groundwater level. The high TPHC readings from soil borings on either side of the underground used motor oil tank apparently do not extend very far. It could be more to disturb the tank and possibly cause a leak than to replace the soil.

CONCLUSION

TRMI has submitted closure reports on three areas of this facility, ie, the concrete vault, the tank field and area A. This proposal covers all the areas of concern under the asphalt pavement. If the NJDEPE agrees with this plan and the cleanup levels, TRMI will begin delineation sampling immediately. After complete delineation, the soil above limits will be removed and replaced with clean fill and an asphalt cover. With timely approval, this project can be completed within six months.

Justification for the proposed sampling plan and cleanup criteria can be summed up with four major points:

1) This is an operating terminal that has handled motor gasoline and fuel oil for more than fifty years. It is a fairly clean terminal considering the fact that it has operated in this service in a highly industrial area for that period. It is not under

control of TRMI and TRMI may not have caused some of the conditions requiring cleanup.

2) All the area under discussion is under an asphalt cap. This asphalt layer will greatly reduce or eliminate the migration of the petroleum hydrocarbons. The soil is thin in these areas only ranging between one and two feet thick. The asphalt and road base material is eighteen inches thick in most places.

3) The proposed cleanup levels are equal to or more stringent than the NJDEPE proposed SITE REMEDIATION PROGRAM Cleanup standards for Contaminated sites. This site appears to meet the criteria for subchapter 7 "ALTERNATE CLEANUP STANDARDS AND DEFERRALS OF A CLEANUP". The site is industrial and will remain so until the present owner decides to use the property in another manner. The property will still be required to trigger ECRA.

4) A risk assessment was prepared and submitted to the NJDEPE for these areas using extremely conservative calculations which proved that all the proposed cleanup levels are well below acceptable risk levels.

Jerry, TRMI is anxious to complete this project and I feel that you are too. Your assistance in obtaining approval for this proposal will be greatly appreciated.

Yours very truly,

J. W. Hearn
Manager-Area Operations

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FAX TRANSMITTAL COVER SHEET

DATE: 3/4/92 NO. OF PAGES (INCLUDING COVER) 6

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TEXACO REFINING AND MARKETING BAYONNE TERMINAL

ADDITIONAL
COMMENTS:

4.0 PROPOSED REMEDIAL ACTION

As stated, excavation is the remedial action of choice in the paved areas. Contingent upon NJDEP review and approval of an elevated TPHC cleanup level based upon the risk assessment, additional sampling will be conducted to determine the limits of excavation. Once the areas are defined, they will be excavated.

Excavation of impacted areas will terminate at the location determined by sampling to be below the established cleanup level. Postexcavation sidewall samples will not be necessary as the excavation terminus will have been predetermined by the delineation sampling already performed. The vertical extent of excavations will be limited by the groundwater table which will eliminate the need for the collection of base samples. The excavation will be immediately filled with gravel as completed in order to facilitate continued operations of the terminal which will remain active. After backfilling the areas will be paved so as to restore the site to original grade.

Excavation will be conducted in such a way as not to undermine the structural integrity of buildings, aboveground pipe rack supports, underground utilities, and pipelines. Standard engineering practices will be utilized in determining the clearances required by such obstructions.

Tables

TABLE 1

1988 PAVED AREA SOIL SAMPLING ANALYTICAL RESULTS
NEWARK TERMINAL
NEWARK, NEW JERSEY

Sample Designation	Sample Depth	TPHC (ppm)	Benzene (ppm)	Toluene (ppm)	Xylene (ppm)
SB-12	24"-30"	18,000	ND	ND	0.3
SB-13	24"-30"	4,600	1.2	ND	6.6
SB-14	24"-30"	38,000	1.7	0.5	5.3
SB-15	24"-30"	14,000	ND	ND	4.2
SB-16	24"-30"	2,600	ND	ND	ND
SB-17	24"-30"	7,300	0.4	1.0	3.9
SB-18	24"-30"	28,000	1.4	1.2	8.7
SB-19	24"-30"	4,300	0.8	0.11	2.2
SB-20	24"-30"	13,000	ND	ND	8.0
SB-21	24"-30"	14,000	0.6	0.2	20.0
SB-22	24"-30"	980	0.06	ND	0.04
SB-23	24"-30"	16,000	0.7	ND	3.5
SB-24	24"-30"	17,000	12	9.2	35
SB-25/MW-14	24"-30"	11,000	6.3	4.7	30
SB-26	24"-30"	12,000	10	7.5	29
SB-27	24"-30"	1,900	0.3	ND	0.8
SB-26A		320	Na	NA	NA
SB-27A		1,900	NA	NA	NA

ND - Nondetectable
NA - Not Analyzed

TABLE 2

WEST YARD PAVED AREA
18-24" ANALYTICAL RESULTS
NEWARK TERMINAL
NEWARK, NEW JERSEY

Sample Point	Sample Date	Total Petroleum Hydrocarbons (ppm)	Lead (ppm)
GHA-1	5/8/90	410	88.1
GHA-2	5/8/90	2,000	902
GHA-3	5/8/90	2,300	983
GHA-4	5/8/90	270	1,940
GHA-5	5/8/90	400	977
GHA-6	5/8/90	59	118
GHA-7	5/8/90	79	169
GHA-8	5/8/90	380	936
GHA-9	5/8/90	320	550
GHA-10	5/8/90	11,000	720
GHA-11	5/8/90	51	67.5
GHA-12	5/8/90	71,000	1,380
GHA-13	5/8/90	7,000	87
GHA-14	5/8/90	18,000	68.1
GHA-15	5/8/90	1,400	604
2GHA-1	7/11/90	2,540	--
2GHA-2	7/12/90	2,710	--
2GHA-3	7/12/90	17,400	--
2GHA-4	7/12/90	2,540	--
2GHA-5	7/12/90	50,000	--
2GHA-6	7/12/90	4,900	--
2GHA-7	7/12/90	1,250	--
2GHA-8	7/12/90	2,070	--

ppm - parts per million
- - not analyzed

TABLE 3

EAST YARD PAVED AREA
18-24" ANALYTICAL RESULTS
NEWARK TERMINAL
NEWARK, NEW JERSEY

Sample Point	Sample Date	Total Petroleum Hydrocarbons (ppm)	Lead (ppm)	P.P. Volatile Organics (ppb)	Library Search Volatile Organics (ppb)	P.P. Base Neutral/Acid Extractables (ppb)	Library Search Base Neutral/Acid Extractables (ppb)	Napthalene (ppb)
HA-1	5/7/90	2,900	138	--	--	--	--	--
HA-2	5/7/90	1,800	634	--	--	--	--	--
HA-3	5/7/90	2,300	365	--	--	--	--	--
HA-4	5/7/90	17,000	172	7,200	1,344,000	29,000 (J-45,200)	2,306,000	ND
HA-5	5/7/90	15,000	64.3	--	--	--	--	--
HA-6	5/7/90	13,000	52.8	--	--	--	--	--
HA-7	5/7/90	17,000	66.0	--	--	--	--	--
HA-8	5/7/90	14,000	45	--	--	--	--	--
HA-9	5/7/90	18,000	74.9	--	--	--	--	--
HA-10	5/7/90	4,500	10.2	--	--	92,000 (J-10,300)	9,630,000	92,000
HA-13	5/7/90	7,900	206	ND (J-1000)	348,000	ND (J-6,130)	535,000	ND
HA-14	5/7/90	1,700	308	--	--	--	--	--
HA-15	5/7/90	3,000	6,430	--	--	--	--	--
HA-16	5/7/90	10,000	35.5	6,200	1,624,000	26,000 (J-5,520)	1,802,000	15,000
HA-17	5/7/90	11,000	126	--	--	--	--	--
HA-18	5/7/90	4,900	110	--	--	--	--	--
HA-19	5/7/90	14,000	460	4,500	1,227,000	ND (J-28,410)	2,053,000	ND (J-7,200)
HA-20	5/7/90	9,700	213	--	--	--	--	--
HA-22	5/7/90	320	264	--	--	--	--	--
HA-23	5/7/90	4,100	225	--	--	--	--	--
HA-24	5/7/90	1,000	278	--	--	--	--	--
HA-25	5/7/90	930	211	--	--	--	--	--
HA-26	5/7/90	190	23.9	--	--	--	--	--
HA-27	5/7/90	110	297	--	--	--	--	--
HA-28	5/7/90	180	93.9	--	--	--	--	--

ENG/ay225-tbls/6

TABLE 5 (continued)

EAST YARD PAVED AREA
18-24" ANALYTICAL RESULTS
NEWARK TERMINAL
NEWARK, NEW JERSEY

Sample Point	Sample Date	Total Petroleum Hydrocarbons (ppm)	Lead (ppm)	Volatile Organics (ppb)	Library Search Volatile Organics (ppb)	Base Neutral/Acid Extractables (ppb)	Library Search Base Neutral/Acid Extractables (ppb)	Napthalene (ppb)
HA-29	5/7/90	200	40.2	--	--	--	--	--
HA-30	5/7/90	1,400	326	--	--	--	--	--
HA-31	5/8/90	5,700	211	--	--	--	--	--
HA-32	5/8/90	140	164	--	--	--	--	--
HA-33	5/8/90	490	186	20 (J-5)	246	ND (J-684)	38,510	ND (J-190)
HA-34	5/8/90	5,300	50.2	--	--	--	--	--
HA-35	5/8/90	79	6.59	41	82	ND (J-497)	17,860	ND (J-51)
HA-36	5/8/90	1,000	114	--	--	--	--	--
HA-37	5/8/90	5,700	778	--	--	--	--	--
HA-38	5/8/90	3,400	152	ND	18,560	7,850 (J-1,140)	171,400	ND (J-130)
HA-39	5/8/90	4,200	80.8	--	--	--	--	--
2HA-1	7/9/90	7,670	--	--	--	--	--	--
2HA-2	7/9/90	9,170	--	--	--	--	--	--
2HA-3	7/9/90	7,770	--	--	--	--	--	--
2HA-4	7/9/90	53	--	--	--	--	--	--
2HA-5	7/9/90	6,750	--	--	--	--	--	--
2HA-6	7/9/90	7,000	--	--	--	--	--	--
2HA-7	7/9/90	9,770	--	--	--	--	--	--
2HA-8	7/9/90	11,400	--	--	--	--	--	--
2HA-9	7/9/90	25,800	--	--	--	--	--	--
2HA-10	7/9/90	20,100	--	--	--	--	--	--
2HA-11	7/9/90	34,600	--	--	--	--	--	--
2HA-12	7/9/90	12,100	--	--	--	--	--	--
2HA-13	7/9/90	3,400	--	--	--	--	--	--
2HA-14	7/10/90	7,240	--	--	--	--	--	--
2HA-15	7/10/90	6,090	--	--	--	--	--	--
2HA-16	7/10/90	290	--	--	--	--	--	--

ENG/ay225-tbls/7

TABLE 3 (continued)

EAST YARD PAVED AREA
18-24" ANALYTICAL RESULTS
NEWARK TERMINAL
NEWARK, NEW JERSEY

Sample Point	Sample Date	Total Petroleum Hydrocarbons (ppm)	Lead (ppm)	Volatile Organics (ppb)	Library Search Volatile Organics (ppb)	Base Neutral/Acid Extractables (ppb)	Library Search Base Neutral/Acid Extractables (ppb)	Napthalene (ppb)
2HA-17	7/10/90	2,590	--	--	--	--	--	--
2HA-18	7/10/90	12,500	--	--	--	--	--	--
2HA-19	7/10/90	1,240	--	--	--	--	--	--
2HA-20	7/10/90	2,600	--	--	--	--	--	--
2HA-21	7/10/90	4,530	--	--	--	--	--	--
2HA-22	7/10/90	7,840	--	--	--	--	--	--
2HA-23	7/10/90	10,600	--	--	--	--	--	--
2HA-24	7/10/90	3,960	--	--	--	--	--	--
2HA-25	7/10/90	4,160	--	--	--	--	--	--
2HA-26	7/10/90	190	--	--	--	--	--	--
2HA-27	7/10/90	570	--	--	--	--	--	--
2HA-28	7/10/90	22,700	--	--	--	--	--	--
2HA-29	7/10/90	1,190	--	--	--	--	--	--
2HA-30	7/10/90	220	--	--	--	--	--	--
2HA-31	7/10/90	5,910	--	--	--	--	--	--
2HA-32	7/11/90	6,490	--	--	--	--	--	--
2HA-33	7/11/90	4,900	--	--	--	--	--	--
2HA-34	7/11/90	9,470	--	--	--	--	--	--
2HA-35	7/19/90	1,850	--	--	--	--	--	--
2HA-36	7/19/90	2,120	--	--	--	--	--	--
2HA-37	7/19/90	5,730	--	--	--	--	--	--
2HA-38	7/19/90	8,500	--	--	--	--	--	--
2HA-39	7/19/90	16,900	--	--	--	--	--	--
2HA-40	7/19/90	2,550	--	--	--	--	--	--
2HA-41	7/19/90	1,110	--	--	--	--	--	--
2HA-42	7/19/90	16,700	--	--	--	--	--	--
2HA-43	7/19/90	530	--	--	--	--	--	--
2HA-44	7/19/90	8,920	--	--	--	--	--	--
2HA-45	7/19/90	11,300	--	--	--	--	--	--
2HA-46	7/19/90	21,900	--	--	--	--	--	--
2HA-47	7/19/90	14,700	--	--	--	--	--	--

TABLE 5 (Continued)

EAST YARD PAVED AREA
18-24" ANALYTICAL RESULTS
NEWARK TERMINAL
NEWARK, NEW JERSEY

Sample Point	Sample Date	Total Petroleum Hydrocarbons (ppm)	Lead (ppm)	Volatile Organics (ppb)	Library Search Volatile Organics (ppb)	Base Neutral/Acid Extractables (ppb)	Library Search Base Neutral/Acid Extractables (ppb)	Napthalene (ppb)
2HA-48	7/19/90	14,000	--	--	--	--	--	--
2HA-49	7/19/90	9,320	--	--	--	--	--	--
2HA-50	7/20/90	8,440	--	--	--	--	--	--
2HA-51	7/20/90	320	13.5	250	--	ND	--	ND
2HA-52	7/20/90	230	29.6	--	--	ND (J-276)	39,960	ND
2HA-53	7/20/90	1,980	--	--	--	--	--	--
2HA-54	7/20/90	590	--	--	--	--	--	--
2HA-55	7/20/90	22,100	--	--	--	--	--	--
2HA-56	7/20/90	8,320	--	--	--	--	--	--
2HA-57	7/20/90	480	239	--	--	18,300 (J-1,310)	26,240	ND (J-170)
2HA-58	7/20/90	2,420	--	--	--	--	--	--
2HA-59	7/20/90	8,820	--	--	--	--	--	--
2HA-60	7/20/90	2,820	--	--	--	--	--	--
2HA-61	7/20/90	190	320	--	--	58,840 (J-240)	44,900	640
2HA-62	7/20/90	2,540	--	--	--	--	--	--
2HA-63	7/20/90	3,360	--	--	--	--	--	--
2HA-64	7/20/90	1,000	--	--	--	--	--	--
3HA-1	7/25/90	2,160	--	--	--	--	--	--
3HA-2	7/25/90	320	17.9	--	--	460 (J-459)	41,400	460
2HA-3	7/25/90	3,520	--	--	--	--	--	--
3HA-4	7/25/90	1,120	--	--	--	--	--	--
3HA-5	7/26/90	15,900	--	--	--	--	--	--
3HA-6	7/26/90	9,660	--	--	--	--	--	--
3HA-7	7/26/90	7,070	--	--	--	--	--	--
3HA-9	7/27/90	140	682	--	--	11,730 (J-2346)	27,960	130
3HA-10	7/27/90	11,400	--	--	--	--	--	--
3HA-11	7/27/90	1,670	--	--	--	--	--	--

TABLE 5 (continued)

EAST YARD PAVED AREA
18-24" ANALYTICAL RESULTS
NEWARK TERMINAL
NEWARK, NEW JERSEY

Sample Point	Sample Date	Total Petroleum Hydrocarbons (ppm)	Lead (ppm)	Volatile Organics (ppb)	Library Search Volatile Organics (ppb)	Base Neutral/Acid Extractables (ppb)	Library Search Base Neutral/Acid Extractables (ppb)	Napthalene (ppb)
3HA-12	7/27/90	4,820	--	--	--	--	--	--
3HA-13	7/27/90	2,510	--	--	--	--	--	--
3HA-14	7/27/90	1,910	--	--	--	--	--	--
3HA-15	7/27/90	4,980	--	--	--	--	--	--
3HA-16	7/27/90	51,700	--	--	--	--	--	--
3HA-17	7/30/90	30,500	--	--	--	--	--	--
3HA-18	7/30/90	2,640	--	--	--	--	--	--
3HA-20	7/30/90	2,880	--	--	--	--	--	--
4HA-1	9/6/90	10,500	--	ND (J-39,000)	--	ND (J-5,069)	1,236,000	ND
4HA-2	9/6/90	17,300	--	68,000	-- (J-15,140)	62,000	2,403,000	62,000
4HA-3	9/6/90	90	--	ND (J-310,000)	--	ND (J-49)	20,850	ND
4HA-4	9/6/90	49	--	ND (J-4)	--	ND (J-922)	4,990	ND
4HA-5	9/6/90	720	--	5,690	--	440 (J-1,018)	32,400	ND
4HA-6	9/6/90	41,600	--	--	--	48,000 (J-8,100)	5,660,000	ND
4HA-7	9/6/90	4,900	--	ND (J-1010)	--	ND (J-3,140)	316,700	ND
4HA-8	9/6/90	33,500	--	666,000 (J-37,000)	--	745,000 (J-143,000)	7,990,000	ND

ppm - Parts per million
ppb - Parts per billion
J - The compound was present but the concentration listed is an estimated value which is less than the minimum detection limit but greater than zero.

TABLE 4

THEORETICAL RESIDUAL HYDROCARBON CONCENTRATIONS

Soil Porosity (percent)	RESIDUAL SATURATION (percent of total)					
	5	10	15	20	25	30
20	3,400	6,800	10,200	13,600	17,000	20,400
30	5,100	10,200	15,300	20,400	25,400	30,500
40	6,800	13,500	20,300	27,000	33,800	40,500
50	8,512	17,024	25,536	34,304	42,560	51,072
60	10,144	20,288	30,432	40,576	50,720	60,864

(a) All results are reported in milligrams per kilogram

Reprinted from Henry and Hansen, 1989.

TABLE 5

SUMMARY OF ANALYTICAL RESULTS OF
NOVEMBER 12, 1990 GROUND WATER SAMPLING

SAMPLE POINT	MW-1	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13	MW-14	FIELD BLANK	TRIP BLANK
SAMPLE DATE	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90
PARAMETERS															
VOLATILE ORGANICS (ppb)															
Chloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	ND	ND	2J	3J	1J	ND	ND	ND	ND	ND	ND	ND	ND	1J	ND
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-chloroethylvinyl ether	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	ND	460	ND	ND	6J	ND	ND	ND	ND	240	520	ND	12	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	ND	ND	ND	ND	4J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	73J	4J	2J	ND	ND	ND	ND	ND	ND	43J	ND	ND	ND	ND
Chlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acrolein	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acrylonitrile	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

TABLE 5

SUMMARY OF ANALYTICAL RESULTS OF
NOVEMBER 12, 1990 GROUND WATER SAMPLING

SAMPLE POINT	MW-1	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13	MW-14	FIELD BLANK	TRIP BLANK
SAMPLE DATE	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90
PARAMETERS															
TOTAL PRIORITY POLLUTANT															
VOLATILE ORGANICS (ppb)	ND	460	ND	ND	ND	ND	ND	ND	ND	240	520	ND	12	ND	ND
TOTAL NON-PRIORITY POLLUTANT															
VOLATILE ORGANICS (ppb)	70	2,970	80	110	79	106	1,334	640	4,013	1,130	2,560	111	242	ND	37
TOTAL PRIORITY POLLUTANT															
VOLATILE ORGANICS DETECTED															
BUT BELOW DETECTION LIMITS (ppb)	ND	73	6	5	11	ND	ND	ND	ND	ND	43	ND	ND	1	ND
BASE NEUTRAL ORGANICS															
N-Nitrosodimethylamine	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
Bis(2-Chloroethyl)ether	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
1,3-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
1,4-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
1,2-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
Bis(2-Chloroisopropyl)ether	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
Hexachloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
N-Nitroso-di-n propylamine	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
Nitrobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
Isophorone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
Bis(2-Chloroethoxy)methane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
1,2,4-Trichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
Naphthalene	ND	14	3J	ND	ND	ND	ND	ND	ND	ND	61	ND	ND	ND	--
Hexachlorobutadiene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
Hexachlorocyclopentadiene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
2-Chloronaphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
Dimethyl phthalate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
Acenaphthylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
2,6-Dinitrotoluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
Acenaphthene	ND	3J	ND	ND	ND	3J	2J	6J	ND	3J	3J	ND	1J	ND	--

TABLE 5

SUMMARY OF ANALYTICAL RESULTS OF
NOVEMBER 12, 1990 GROUND WATER SAMPLING

SAMPLE POINT	MW-1	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13	MW-14	FIELD BLANK	TRIP BLANK
SAMPLE DATE	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90
PARAMETERS															
2,4-Dinitrotoluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
Diethyl phthalate	ND	ND	ND	ND	ND	1J	2J	ND	ND	ND	1J	ND	ND	ND	--
Fluorene	ND	4J	ND	ND	ND	1J	2J	6J	ND	4J	5J	ND	ND	ND	--
1,2-Diphenylhydrazine	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
4-Chlorophenyl Phenyl Ether	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
4-Bromophenyl Phenyl Ether	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
N-nitrosodiphenylamine	ND	ND	190	2J	ND	ND	1J	ND	ND	ND	ND	110	ND	ND	--
Hexachlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
Phenanthrene	ND	3J	ND	ND	ND	ND	2J	6J	ND	ND	6J	ND	ND	ND	--
Anthracene	ND	ND	ND	ND	ND	ND	ND	1J	ND	ND	ND	ND	ND	ND	--
Di-n-butyl phthalate	ND	ND	ND	ND	ND	ND	1J	ND	ND	ND	ND	ND	ND	ND	--
Fluoranthene	ND	ND	ND	ND	ND	ND	ND	1J	ND	ND	1J	ND	ND	ND	--
Benzidine	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
Pyrene	ND	ND	ND	ND	ND	ND	ND	1J	ND	ND	1J	ND	ND	ND	--
Butyl Benzyl Phthalate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
3,3'-Dichlorobenzidine	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
Benzo(a)anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
Chrysene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
Bis(2-Ethyl hexyl)phthalate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7J	ND	ND	--
Di-n-Octyl phthalate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
Benzo(b)fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
Benzo(k)fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
Benzo(a)pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
Indeno(1,2,3,c,d)pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
Dibenzo(a,h)anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
Benzo(g,h,i)perylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	--
TOTAL PRIORITY POLLUTANT BASE NEUTRAL ORGANICS (ppb)	ND	14	190	ND	ND	ND	ND	ND	ND	ND	61	110	ND	ND	--

TABLE 5

SUMMARY OF ANALYTICAL RESULTS OF
NOVEMBER 12, 1990 GROUND WATER SAMPLING

SAMPLE POINT	MW-1	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13	MW-14	FIELD BLANK	TRIP BLANK
SAMPLE DATE	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90	11/12/90
PARAMETERS															
TOTAL NON-PRIORITY POLLUTANT BASE NEUTRAL ORGANICS (ppb)	ND	992	547	333	ND	125	589	455	10	692	1,350	481	432	169	--
TOTAL PRIORITY POLLUTANT BASE NEUTRAL ORGANICS DETECTED BUT BELOW DETECTION LIMITS (ppb)	ND	10	3	2	ND	5	10	21	ND	7	17	7	1	ND	--
TOTAL DISSOLVED SOLIDS (mg/l)	670	690	660	760	860	520	580	630	990	700	470	490	1,500	16	--
pH	7.2	7.3	8.1	7.3	7.2	7.4	6.8	6.8	6.5	7.2	7.0	7.7	6.7	5.7	--

1. "--" signifies not analyzed.
2. "ND" signifies not detected.
3. "J" signifies detected but below detection limits.

TABLE 6

WEST YARD PAVED AREA
ANALYTICAL RESULT AND QA/QC DATA KEY
NEWARK TERMINAL
NEWARK, NEW JERSEY

Sample Point	Sample Date	Total Petroleum Hydrocarbons Volume, Tab	Lead Volume, Tab
GHA-1	5/8/90	3,2	3,2
GHA-2	5/8/90	3,2	3,2
GHA-3	5/8/90	3,2	3,2
GHA-4	5/8/90	3,2	3,2
GHA-5	5/8/90	3,2	3,2
GHA-6	5/8/90	3,2	3,2
GHA-7	5/8/90	3,2	3,2
GHA-8	5/8/90	3,2	3,2
GHA-9	5/8/90	3,2	3,2
GHA-10	5/8/90	3,2	3,2
GHA-11	5/8/90	3,2	3,2
GHA-12	5/8/90	3,2	3,2
GHA-13	5/8/90	3,2	3,2
GHA-14	5/8/90	3,2	3,2
GHA-15	5/8/90	3,2	3,2
2GHA-1	7/11/90	4,3	-
2GHA-2	7/12/90	4,4	-
2GHA-3	7/12/90	4,4	-
2GHA-4	7/12/90	4,4	-
2GHA-5	7/12/90	4,4	-
2GHA-6	7/12/90	4,4	-
2GHA-7	7/12/90	4,4	-
2GHA-8	7/12/90	4,4	-

- not analyzed

EAST YARD PAVED AREA
ANALYTICAL RESULT AND QA/QC DATA KEY
NEWARK TERMINAL
NEWARK, NEW JERSEY

Sample Point	Sample Date	Total Petroleum Hydrocarbons volume, tab	Lead volume, tab	P.P. Volatile Organics volume, tab	Library Search Volatile Organics volume, tab	P.P. Base Neutral/Acid Extractables volume, tab	Library Search Base Neutral/Acid Extractables volume, tab	Napthalene volume, tab
HA-1	5/7/90	3,1	3,1	-	-	-	-	-
HA-2	5/7/90	3,1	3,1	-	-	-	-	-
HA-3	5/7/90	3,1	3,1	-	-	-	-	-
HA-4	5/7/90	3,1	3,1	3,1	3,1	3,1(5,4)	3,1(5,4)	3,1
HA-5	5/7/90	3,1	3,1	-	-	-	-	-
HA-6	5/7/90	3,1	3,1	-	-	-	-	-
HA-7	5/7/90	3,1	3,1	-	-	-	-	-
HA-8	5/7/90	3,1	3,1	-	-	-	-	-
HA-9	5/7/90	3,1	3,1	-	-	-	-	-
HA-10	5/7/90	3,1	3,1	-	-	3,1(5,4)	3,1(5,4)	3,1
HA-13	5/7/90	3,1	3,1	3,1	3,1	3,1(5,4)	3,1(5,4)	3,1
HA-14	5/7/90	3,1	3,1	-	-	-	-	-
HA-15	5/7/90	3,1	3,1	-	-	-	-	-
HA-16	5/7/90	3,1	3,1	3,1	3,1	3,1(5,4)	3,1(5,4)	3,1
HA-17	5/7/90	3,1	3,1	-	-	-	-	-
HA-18	5/7/90	3,1	3,1	-	-	-	-	-
HA-19	5/7/90	3,1	3,1	3,1	3,1	3,1(5,4)	3,1(5,4)	3,1
HA-20	5/7/90	3,1	3,1	-	-	-	-	-
HA-22	5/7/90	3,1	3,1	-	-	-	-	-
HA-23	5/7/90	3,1	3,1	-	-	-	-	-
HA-24	5/7/90	3,1	3,1	-	-	-	-	-
HA-25	5/7/90	3,1	3,1	-	-	-	-	-
HA-26	5/7/90	3,1	3,1	-	-	-	-	-
HA-27	5/7/90	3,1	3,1	-	-	-	-	-
HA-28	5/7/90	3,1	3,1	-	-	-	-	-

Parentheses indicate analyzed for acid extractables
- not analyzed

E (Continued)

EAST YARD PAVED AREA
ANALYTICAL RESULT AND QA/QC DATA KEY
NEWARK TERMINAL
NEWARK, NEW JERSEY

Sample Point	Sample Date	Total Petroleum Hydrocarbons volume, tab	Lead volume, tab	P.P. Volatile Organics volume,tab	Library Search Volatile Organics volume, tab	P.P. Base Neutral/Acid Extractables volume, tab	Library Search Base Neutral/Acid Extractables volume, tab	Napthalene volume, tab
HA-29	5/7/90	3,1	3,1	-	-	-	-	-
HA-30	5/7/90	3,1	3,1	-	-	-	-	-
HA-31	5/8/90	3,2	3,2	-	-	-	-	-
HA-32	5/8/90	3,2	3,2	-	-	-	-	-
HA-33	5/8/90	3,2	3,2	3,2	3,2	3,2(5,4)	3,2(5,4)	3,2
HA-34	5/8/90	3,2	3,2	-	-	-	-	-
HA-35	5/8/90	3,2	3,2	3,2	3,2	3,2(5,4)	3,2(5,4)	3,2
HA-36	5/8/90	3,2	3,2	-	-	-	-	-
HA-37	5/8/90	3,2	3,2	-	-	-	-	-
HA-38	5/8/90	3,2	3,2	3,2	3,2	3,2(5,4)	3,2(5,4)	3,2
HA-39	5/8/90	3,2	3,2	-	-	-	-	-
2HA-1	7/9/90	4,1	-	-	-	-	-	-
2HA-2	7/9/90	4,1	-	-	-	-	-	-
2HA-3	7/9/90	4,1	-	-	-	-	-	-
2HA-4	7/9/90	4,1	-	-	-	-	-	-
2HA-5	7/9/90	4,1	-	-	-	-	-	-
2HA-6	7/9/90	4,1	-	-	-	-	-	-
2HA-7	7/9/90	4,1	-	-	-	-	-	-
2HA-8	7/9/90	4,1	-	-	-	-	-	-
2HA-9	7/9/90	4,1	-	-	-	-	-	-
2HA-10	7/9/90	4,1	-	-	-	-	-	-
2HA-11	7/9/90	4,1	-	-	-	-	-	-
2HA-12	7/9/90	4,1	-	-	-	-	-	-
2HA-13	7/9/90	4,1	-	-	-	-	-	-
2HA-14	7/10/90	4,2	-	-	-	-	-	-

Parentheses indicate analyzed for acid extractables
- not analyzed

TABLE 7 (continued)

EAST YARD PAVED AREA
ANALYTICAL RESULT AND QA/QC DATA KEY
NEWARK TERMINAL
NEWARK, NEW JERSEY

Sample Point	Sample Date	Total Petroleum Hydrocarbons volume, tab	Lead volume, tab	P.P. Volatile Organics volume,tab	Library Search Volatile Organics volume, tab	P.P. Base Neutral/Acid Extractables volume, tab	Library Search Base Neutral/Acid Extractables volume, tab	Napthalene volume, tab
2HA-15	7/10/90	4,2	-	-	-	-	-	-
2HA-16	7/10/90	4,2	-	-	-	-	-	-
2HA-17	7/10/90	4,2	-	-	-	-	-	-
2HA-18	7/10/90	4,2	-	-	-	-	-	-
2HA-19	7/10/90	4,2	-	-	-	-	-	-
2HA-20	7/10/90	4,2	-	-	-	-	-	-
2HA-21	7/10/90	4,2	-	-	-	-	-	-
2HA-22	7/10/90	4,2	-	-	-	-	-	-
2HA-23	7/10/90	4,2	-	-	-	-	-	-
2HA-24	7/10/90	4,2	-	-	-	-	-	-
2HA-25	7/10/90	4,2	-	-	-	-	-	-
2HA-26	7/10/90	4,2	-	-	-	-	-	-
2HA-27	7/10/90	4,2	-	-	-	-	-	-
2HA-28	7/10/90	4,2	-	-	-	-	-	-
2HA-29	7/10/90	4,2	-	-	-	-	-	-
2HA-30	7/10/90	4,2	-	-	-	-	-	-
2HA-31	7/10/90	4,2	-	-	-	-	-	-
2HA-32	7/11/90	4,3	-	-	-	-	-	-
2HA-33	7/11/90	4,3	-	-	-	-	-	-
2HA-34	7/11/90	4,3	-	-	-	-	-	-
2HA-35	7/19/90	4,5	-	-	-	-	-	-
2HA-36	7/19/90	4,5	-	-	-	-	-	-
2HA-37	7/19/90	4,5	-	-	-	-	-	-
2HA-38	7/19/90	4,5	-	-	-	-	-	-
2HA-39	7/19/90	4,5	-	-	-	-	-	-
2HA-40	7/19/90	4,5	-	-	-	-	-	-
2HA-41	7/19/90	4,5	-	-	-	-	-	-

Parentheses indicate analyzed for acid extractables
- not analyzed

(E [illegible]ont[illegible]d)

EAST YARD PAVED AREA
ANALYTICAL RESULT AND QA/QC DATA KEY
NEWARK TERMINAL
NEWARK, NEW JERSEY

Sample Point	Sample Date	Total Petroleum Hydrocarbons volume, tab	Lead volume, tab	P.P. Volatile Organics volume, tab	Library Search Volatile Organics volume, tab	P.P. Base Neutral/Acid Extractables volume, tab	Library Search Base Neutral/Acid Extractables volume, tab	Napthalene volume, tab
2HA-42	7/19/90	4,5	-	-	-	-	-	-
2HA-43	7/19/90	4,5	-	-	-	-	-	-
2HA-44	7/19/90	4,5	-	-	-	-	-	-
2HA-45	7/19/90	4,5	-	-	-	-	-	-
2HA-46	7/19/90	4,5	-	-	-	-	-	-
2HA-47	7/19/90	4,5	-	-	-	-	-	-
2HA-48	7/19/90	4,5	-	-	-	-	-	-
2HA-49	7/19/90	4,5	-	-	-	-	-	-
2HA-50	7/20/90	4,6	-	-	-	-	-	-
2HA-51	7/20/90	4,6	4,7	4,7	-	4,7(5,4)	5,4	4,7
2HA-52	7/20/90	4,6	4,7	-	-	4,7(5,4)	5,4	4,7
2HA-53	7/20/90	4,6	-	-	-	-	-	-
2HA-54	7/20/90	4,6	-	-	-	-	-	-
2HA-55	7/20/90	4,6	-	-	-	-	-	-
2HA-56	7/20/90	4,6	-	-	-	-	-	-
2HA-57	7/20/90	4,6	4,7	-	-	4,7(5,4)	5,4	4,7
2HA-58	7/20/90	4,6	-	-	-	-	-	-
2HA-59	7/20/90	4,6	-	-	-	-	-	-
2HA-60	7/20/90	4,6	-	-	-	-	-	-
2HA-61	7/20/90	4,6	4,7	-	-	4,7(5,4)	5,4	4,7
2HA-62	7/20/90	4,6	-	-	-	-	-	-
2HA-63	7/20/90	4,6	-	-	-	-	-	-
2HA-64	7/20/90	4,6	-	-	-	-	-	-
3HA-1	7/25/90	4,8	-	-	-	-	-	-
3HA-2	7/25/90	4,8	4,7	-	-	4,7	5,4	4,7
3HA-3	7/25/90	4,8	-	-	-	-	-	-
3HA-4	7/25/90	4,8	-	-	-	-	-	-

Parentheses indicate analyzed for acid extractables
- not analyzed

ENG/rpts/ay225tbls2

932930034

E (Continued)

EAST YARD PAVED AREA
ANALYTICAL RESULT AND QA/QC DATA KEY
NEWARK TERMINAL
NEWARK, NEW JERSEY

Sample Point	Sample Date	Total Petroleum Hydrocarbons volume, tab	Lead volume, tab	P.P. Volatile Organics volume, tab	Library Search Volatile Organics volume, tab	P.P. Base Neutral/Acid Extractables volume, tab	Library Search Base Neutral/Acid Extractables volume, tab	Napthalene volume, tab
3HA-5	7/26/90	4,9	-	-	-	-	-	-
3HA-6	7/26/90	4,9	-	-	-	-	-	-
3HA-7	7/26/90	4,9	-	-	-	-	-	-
3HA-9	7/27/90	4,10	5,1	-	-	5,4	5,4	5,1
3HA-10	7/27/90	4,10	-	-	-	-	-	-
3HA-11	7/27/90	4,10	-	-	-	-	-	-
3HA-12	7/27/90	4,10	-	-	-	-	-	-
3HA-13	7/27/90	4,10	-	-	-	-	-	-
3HA-14	7/27/90	4,10	-	-	-	-	-	-
3HA-15	7/27/90	4,10	-	-	-	-	-	-
3HA-16	7/27/90	4,10	-	-	-	-	-	-
3HA-17	7/30/90	5,2	-	-	-	-	-	-
3HA-18	7/30/90	5,2	-	-	-	-	-	-
3HA-20	7/30/90	5,2	-	-	-	-	-	-
4HA-1	9/6/90	5,3	-	5,3	-	5,3 (5,4)	5,4	5,3
4HA-2	9/6/90	5,3	-	5,3	-	5,3 (5,4)	5,4	5,3
4HA-3	9/6/90	5,3	-	5,3	-	5,3 (5,4)	5,4	5,3
4HA-4	9/6/90	5,3	-	5,3	-	5,3 (5,4)	5,4	5,3
4HA-5	9/6/90	5,3	-	5,3	-	5,3 (5,4)	5,4	5,3
4HA-6	9/6/90	5,3	-	-	-	5,3 (5,4)	5,4	5,3
4HA-7	9/6/90	5,3	-	5,3	-	5,3 (5,4)	5,4	5,3
4HA-8	9/6/90	5,3	-	5,3	-	5,3 (5,4)	5,4	5,3

Parentheses indicate analyzed for acid extractables
- not analyzed

ENG/rpts/ay225tbls2

932930035

Figures

NOTICE ABOUT UNSCANNABLE MAP

THIS MAP CAN BE FOUND IN THE SITE FILE LOCATED AT: U.S. EPA SUPERFUND RECORDS CENTER, 290 BROADWAY, 18TH FLOOR, NY, NY 10007. TO MAKE AN APPOINTMENT TO VIEW THE MATERIAL PLEASE CONTACT THE RECORD CENTER AT (212) 637-4308.

REV. #	DATE	DESCRIPTION OF REVISION	REV. BY	ENG	CHKD BY	APPVD BY
0	3/28/91	DEVELOPED DRAWING	DMB			

PROJECT MANAGER: L. Frey | DRAWN BY: V. Hans

INTERNATIONAL TECHNOLOGY CORPORATION

FIGURE 1
GENERAL FACILITY LAYOUT
NEWARK TERMINAL, NEWARK, NEW JERSEY

Prepared For:

TEXACO MARKETING AND REFINING INC.
BAYONNE, NEW JERSEY
PROJECT No. 529344
JANUARY 1991

LAYER(S)	DATE INITIATED	DRAWING NUMBER
0	1/3/91	52934401

932930037

NOTICE ABOUT UNSCANNABLE MAP

THIS MAP CAN BE FOUND IN THE SITE FILE LOCATED AT: U.S. EPA SUPERFUND RECORDS CENTER, 290 BROADWAY, 18TH FLOOR, NY, NY 10007. TO MAKE AN APPOINTMENT TO VIEW THE MATERIAL PLEASE CONTACT THE RECORD CENTER AT (212) 637-4308.

REV. #	DATE	DESCRIPTION OF REVISION	REV. BY	ENG	CHKD BY	APPVD BY
0	2/22/91	DEVELOPED DRAWING	M.S.M.			

PROJECT MANAGER: L. Frey | DRAWN BY: VSH/DMB

INTERNATIONAL TECHNOLOGY CORPORATION

FIGURE 2
WEST YARD PAVED AREA SAMPLING LOCATIONS AND ANALYTICAL RESULTS NEWARK TERMINAL

Prepared For:

TEXACO REFINING AND MARKETING INC.
BAYONNE, NEW JERSEY
PROJECT No. 529344
FEBRUARY 1991

LAYER(S)	DATE INITIATED	DRAWING NUMBER
0	9/4/90	52934402

932930038

NOTICE ABOUT UNSCANNABLE MAP

THIS MAP CAN BE FOUND IN THE SITE FILE LOCATED AT: U.S. EPA SUPERFUND RECORDS CENTER, 290 BROADWAY, 18TH FLOOR, NY, NY 10007. TO MAKE AN APPOINTMENT TO VIEW THE MATERIAL PLEASE CONTACT THE RECORD CENTER AT (212) 637-4308.

REV. #	DATE	DESCRIPTION OF REVISION	REV. BY	ENG	CHKD BY	APPVD BY
0	2/22/91	DEVELOPED DRAWING	M.S.M.			

PROJECT MANAGER: L. Frey | DRAWN BY: VSH/MB

INTERNATIONAL TECHNOLOGY CORPORATION

FIGURE 3
EAST YARD PAVED AREA
DELINEATION SAMPLING LOCATIONS
NEWARK TERMINAL

Prepared For:

TEXACO REFINING AND MARKETING INC.
BAYONNE, NEW JERSEY
PROJECT No. 529344
FEBRUARY 1991

LAYER(S)	DATE INITIATED	DRAWING NUMBER
0	8-24-91	52934403

932930039

Appendix A

VOLUME I

APPENDIX A

NJDEP APPROVAL LETTER

Let's protect our earth

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF HAZARDOUS WASTE MANAGEMENT
Lance R. Miller, Acting Director
CN 028
Trenton, N.J. 08625-0028
(609) 633-7141
Fax # (609) 633-1454

CERTIFIED MAIL
RETURN RECEIPT REQUESTED
Mr. J.W. Hearn
Texaco, USA
P.O. Box 335
Bayonne, NJ 07002

FEB 22 1990

Dear Mr. Hearn:

RE: Industrial Establishment: Getty Refining & Marketing Corp.
Location: 86 Doremus Avenue, Newark City, Essex County
Block: 5010 Lot: 21
Transaction: Sale of Property, Sale of Business
Cleanup Plan Dated: October 1989
ECRA Case #84455

Pursuant to the authority vested in the Commissioner of the New Jersey Department of Environmental Protection ("NJDEP") by the Environmental Cleanup Responsibility Act, N.J.S.A. 13:1K-6 et seq. (ECRA), and duly delegated to the Assistant Director of the Industrial Site Evaluation Element pursuant to N.J.S.A. 13:1B-4, the above referenced Cleanup Plan submitted on behalf of Getty Refining & Marketing Corp. (Getty) is hereby approved by NJDEP as conditioned below:

I. Approved Cleanup Concentrations

1. Getty shall remediate the soils according to the following levels:

a. Petroleum Hydrocarbons (PHC) shall be remediated to 500 ppm in the paved and unpaved areas of the site. PHC shall be remediated to 5,000 ppm inside the diked tank areas.

b. Getty shall remediate to 1,000 ppm lead (Pb) in soil across the site .

c. Getty shall remediate to 1 ppm volatile organic compounds (VO) and 10ppm base neutrals (BN) in soils across the site.

The above levels were required in the NJDEP letter of May 22, 1989 to Mr. Howard Philips of Texaco.

932930042

II. Soils Cleanup Approval Conditions

2. Getty's proposal for remediation of the concrete vault is acceptable.

3. Getty's proposal to hand excavate inside the Tank Basins is acceptable provided that all post-excavation samples are analyzed for petroleum hydrocarbons (PHC), lead (Pb), and napthalene, with 25% of the samples being analyzed for base neutrals (BN) and volatile organics (VO). The higher levels of PHCs to remain in place may have associated BNs and VOs. These constituents have not been adequately sampled and therefore confirmatory post-excavation sampling shall include these parameters. All backfill used shall be similar in porosity and permeability to the native soils.

4. Getty's proposal to remediate the Unpaved Soil Area (Area A) with selective excavation and in-situ biodegradation is acceptable provided that the 500 ppm PHC Cleanup goal is achieved. Getty shall submit a report which documents the effectiveness of the in-situ biodegration within 180 days of the receipt of the Cleanup Plan Approval. If it is determined that this remediation technology is not effective, Getty shall implement the second alternative, biodegradation of the vadose zone. A detailed description of this technology which clarifies the confusion caused by the use of the term "soil washing" for this technology shall be submitted at this time. A report which documents the effectiveness of the biodegration of the vadose zone shall be submitted within 180 days of the receipt of notification from the NJDEP. If it is determined that this remediation technology is not effective, Getty shall implement the final contingency of soil excavation immediately upon notification from the Department. All post remediation confirmatory samples shall be analyzed for Pb, PHC, and napthalene, with 25% of the samples being analyzed for BN and VO.

5. Getty's proposal for soil venting in this area is acceptable provided that monitoring and post-remedial samples are analyzed for PHC, Pb, naphthalene, BN and VO. Getty shall submit a report which documents the effectiveness of the soil venting within 180 days of the receipt of the Cleanup Plan Approval. If it is determined that this remediation technology is not effective, Getty shall implement the second alternative, biodegradation of the vadose zone. A detailed description of this technology which clarifies the confusion caused by the use of the term "soil washing" shall be submitted at this time. A report which documents the effectiveness of the biodegration of the vadose zone shall be submitted within 180 days of the receipt of notification from the NJDEP. If it is determined that this remediation technology is not effective, Getty shall implement the final contingency of soil excavation immediately upon notification from the NJDEP.

6. Although the NJDEP conditionally approves Getty's proposal for the paved soil areas outside of tank dikes. The NJDEP recognizes Getty's intent to perform additional soil sampling in these areas to confirm the most cost effective remediation technology. Therefore, Getty shall submit the results of this sampling along with the final remediation scheme to be implemented (ie, excavation, soil venting or

biodegradation of the vadose zone) within 90 days of the receipt of this approval. This document shall also include conclusive results of all pilot and bench scale studies to support any proposed alternative remediation technologies.

7. Getty shall take one boring sample in each of the following tank dike areas, Tank 10 (T10), T9, T8, T6 and one sample at boring location #60. All samples shall be taken at a depth of 0-6". Except where specified, borings shall be located south of the tanks or near the highest hit of PHC in the particular tank area. All samples shall be analyzed for BN. This sampling will provide data on levels of BN present in areas which are not scheduled for remediation. If high levels of BN's are found to be present, Getty shall remediate to the satisfaction of the NJDEP.

III. Ground Water Approval Conditions

8. Ground water remediation is not necessary provided that all source areas are remediated to the satisfaction of the NJDEP. Getty shall conduct a monitoring program to ensure the sources of contamination have been effectively remediated to ensure that there is no potential for ground water contamination in the future, and ground water contamination levels do not increase. Remediation may be required if contamination levels increase.

9. Getty shall sample monitoring wells MW-1, MW-3, and MW-4 thru MW-14 semi-annually for BN+15, VO+15, pH and total dissolved solids (TDS). The sampling schedule shall start within 60 days from the date of the Cleanup Plan approval. The wells shall continue to be sampled for a minimum of one year after completion of the soil cleanup.

10. It is Getty's contention that the source of contamination in MW-11 may be the result of a surficial spill which may have entered the flush-mount well through surface runoff. Getty shall protect MW-11 so that the infiltration of surface water is prevented. Getty shall take great care to ensure that the well does not act as a direct pathway for contaminants to enter the ground water. If, during monitoring, an increase in the contamination of this well is noted, further investigation shall be required to determine the source and a ground water cleanup may be required.

11. Getty shall submit the following well data for each monitoring well sampled:

    Depth to water before purging
    Estimated water volume in well
    Purge date/time
    Depth to water after purging
    pH
    TDS

Sample date/time
Depth to water before sampling
pH
TDS
Comments, i.e. slow recharge, turbidity, odor, HNU/OVA readings, etc.

12. The ground water monitoring wells shall not be purged to dryness. The wells shall be sampled no later than two hours after purging the well.

13. Getty shall obtain water level measurements from all wells semi-annually. A ground water contour map shall be included along with the analytical results.

14. The following permits may/shall be required based on the proposed Cleanup Plan. Getty shall contact the appropriate Bureaus for an application within 30 days of the date of the Cleanup Plan approval. The completed applications shall be submitted within 60 days of the date of the Cleanup Plan approval.

    a. Getty shall contact the Bureau of New Source Review (609) 292-6716. An air discharge permit may be required as a result of soil venting and bioremediation proposals.

    b. Getty shall contact the Bureau of Information Systems (609) 984-4428 to obtain an application for NJPDES/DGW permit. A NJPDES/DGW will be required if a soil flushing program is implemented.

IV. General Requirements

15. Getty shall comply with all federal, state and local laws, regulations and ordinances in implementing the approved Cleanup Plan.

16. Getty shall obtain all federal, state and local permits prior to implementation of the approved Cleanup Plan. Should any conditions or limitation of said permits be more stringent than those in the approved Cleanup Plan, then said permit requirements shall supersede the terms of this approval.

17. Upon the written request of NJDEP, Getty shall submit for NJDEP review and approval any additional sampling plans deemed necessary by NJDEP during the implementation of a Cleanup Plan to fully delineate the nature and extent of environmental contamination on or from Getty. Getty shall implement and complete any such additional Sampling Plans, and submit the results thereof, in accordance with the timeframe set forth in the approved additional Sampling Plan. Furthermore, Getty shall prepare and submit to NJDEP for approval, any revisions to the Cleanup Plan necessary to remediate any additional environmental contamination on or from Getty as identified during the cleanup plan implementation, by any additional sampling, or from any other source. Getty shall revise and submit the required information within a reasonable time not to exceed 90 calendar days from receipt of written notification from NJDEP.

18. The ECRA requirement for remediation of all environmental contamination on or from Getty and the terms and conditions of the approved Cleanup Plan shall be binding upon Getty, and its officers, management officials, successors in interest, assigns, tenants and any trustee in bankruptcy or receiver appointed pursuant to a proceeding in law or equity.

19. Getty within 14 days of receipt of this Cleanup Plan approval, shall amend the amount of posted financial assurance specified in paragraph 12A of the Administrative Consent Order to equal the amount of $1,299,200.00 the estimated cost of implementation of the Cleanup Plan or shall provide alternative financial assurance in accordance with the regulatory requirements of N.J.A.C. 7:26B-6 in the amount specified above. Furthermore, Getty shall maintain the required financial assurance until NJDEP issues Getty a written notification that the Cleanup Plan had been fully implemented to NJDEP's satisfaction.

20. Getty shall provide written notification of the completion of the Transaction which subjected the Industrial Establishment to ECRA within seven days of its occurrence.

21. Getty shall prepare and submit to NJDEP monthly written progress reports detailing the implementation of the Cleanup Plan.

22. Getty shall prepare and submit a final written report detailing the actual cleanup actions performed and final cleanup costs including overhead, compared to the cleanup actions, schedule and costs approved in the Cleanup Plan. The report should also include dates of cleanup activities, additional sampling results and other pertinent information.

23. Getty shall provide, within 14 calendar days of receipt of this Cleanup Plan approval, oversight fees in the amount of $12,000.00, based on the cost of the cleanup, in accordance with the regulatory requirements of N.J.A.C. 7:26B-1.10.

VI. Cleanup Plan Schedule of Implementation

24. Getty shall implement the cleanup as per the schedule presented in Section 10 of the Cleanup Plan dated October, 1989, and that presented in this approval.

25. Getty shall initiate the Cleanup Plan as conditioned in this letter within two weeks of receipt of this letter, and in accordance with N.J.A.C. 7:26B-5.5(c), begin implementation of this Cleanup Plan according to the proposed time schedule. If any delay or anticipated delay had been or will be caused by events beyond the control of Getty, then Getty shall notify NJDEP in writing within 10 days of the delay, describing the delay in precise cause or causes and requesting an extension. Increases in the costs or expenses incurred in fulfilling the requirements contained in this letter shall not be a basis for an extension and such extension requests will not be granted. If Getty fails to implement the Cleanup Plan in accordance with the proposed schedule, the NJDEP reserves the right to implement full enforcement measures and assess penalties pursuant to N.J.A.C. 7:26B-9.

NJDEP's approval, as conditioned above, is limited to the above referenced Cleanup Plan only. This Cleanup Plan approval shall not limit, restrict or prohibit NJDEP from directing on-site or off-site cleanup, if deemed necessary by NJDEP, under any other statute, rule or regulation. Getty is hereby required to fully implement the referenced Cleanup Plan, as conditioned above, in accordance with the time schedule as set forth therein. By issuing this Cleanup Plan Approval, NJDEP continues to reserve all rights to pursue any penalties allowable under the law for violations of the ECRA statute or regulations associated with this transaction.

Sincerely,

Karl J. Delaney, Assistant Director
Industrial Site Evaluation Element

EJM/sr
c: T. O'Brien, BEAC
S. Mitchell, BGWDC
S. Toppin, BEERA
C. Hylemon, BEAC
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L. Frey, IT Corp.